

**Animas River Stakeholders Group
Upper Cement Creek Working Group**

DRAFT TREATMENT ALTERNATIVE EVALUATION OUTLINE

October 12, 2011

1. INTRODUCTION

- a. Problem Definition
- b. Present project goals
 - i. Improve water quality and aquatic habitat in Animas River
 - ii. Provide community educational opportunities concerning problems arising from historic mining practices and potential solutions.
 - iii. Make recommendations to regulatory and enforcement agencies for the implementation of practical solutions to the problem.

2. SITE DESCRIPTION AND BACKGROUND

3. WATER QUALITY AND QUANTITY

- a. List of all discharges with location, water quality and current flow rate information
- b. Expected short-term and long-term changes in water quality or quantity

4. GOALS FOR METAL LOADING REDUCTION

- a. Define point of discharge
- b. List water quality goals
- c. Define methods for metal loading reduction required
- d. How will goals be measured? Point of compliance? Evaluation of compliance?

5. DESIGN CRITERIA

- a. Define point of compliance (here or above?)
- b. Life of project/Service life of solution
- c. Define appetite for risk
- d. Define factors of safety desired
- e. Need for treatment plant expansion or change in technology
- f. Options for local waste stream disposal
- g. Options for non-local waste stream disposal
- h. Options for reducing water and/or metal load to be treated

6. EVALUATION CRITERIA

- a. Implementability
 - i. Legal
 - ii. Ownership/operation
 - iii. Permitting
- b. Effectiveness/Dependability
- c. Complexity/Ease of operation

- d. Reliability
- e. Space and location requirements
- f. Risks
- g. Technical issues
- h. Waste stream created and management options
- i. Cost
 - i. Capital cost
 - 1. Legal
 - 2. Engineering
 - 3. Permitting
 - 4. Land acquisition
 - ii. Annual cost
 - 1. Consumables
 - 2. Power
 - 3. Transportation cost
 - 4. Waste disposal
 - 5. Labor
 - 6. Winter operation
 - a. Maintain access
 - b. Deliveries
 - 7. Engineering
 - 8. Monitoring
 - 9. Analytical costs
 - 10. Reporting
 - iii. Net Present Value analysis
 - 1. Period of analysis
 - 2. Annual escalation
 - 3. Discount factor
- j. Evaluation scoring

7. TREATMENT TECHNOLOGIES IDENTIFIED/AVAILABLE

- a. Status of technology
 - i. Risk
 - ii. Full scale proven
 - iii. Pilot scale proven
 - iv. Bench scale proven
 - v. Conceptual
- b. Consumables needed
 - i. Lime
 - ii. Chemicals
 - iii. Power
- c. Issues with technology
 - i. Is technology proprietary?
 - ii. Risks?
- d. Waste streams generated
 - i. Disposal options

- e. Waste Stream Disposal Method
 - i. Is sludge hazardous?
 - ii. Is there a beneficial use?
 - iii. Should sludge be dewatered?
 - iv. Is there a potential for metals recovery
 - v. Truck to landfill,
 - vi. Local repository
- f. Review of treatment technologies
 - i. High Density Sludge (HDS) Treatment
 - ii. Rotating Contactor Treatment System (RCTS)
 - iii. Simple Lime Treatment
 - iv. Ion Exchange
 - v. Membrane Treatment
 - vi. Bioreactors
 - vii. Others (in situ)

8. DEVELOPMENT OF ALTERNATIVES

- a. Generalize type of approaches
 - i. Central vs. treatment at each discharge
 - ii. One discharge vs. multiple discharges
 - iii. In-situ treatment
 - iv. Bulkhead removal
- b. Multiple treatment technologies required?
- c. Land ownership
- d. Easements required
- e. Avalanche protection
- f. Power access
- g. Addition or removal of bulkheads
- h. County road access
- i. Flow collection/Conveyance pipelines required
 - i. Surface channels
 - ii. Pressure pipelines

9. EVALUATION OF ALTERNATIVES

10. RECOMMENDED ALTERNATIVE